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SOYBEANS

THERE has been a slow but continuous increase in soybean production in Canada during the past decade. This increase may be explained, in part, by the development of new and improved early maturing varieties which have resulted in an extension of the area over which this crop may be grown successfully. However, the chief reason for the increased production of soybeans can be attributed to a realization, on the part of stockmen, that soybean protein can be used satisfactorily to balance the coarse grains—oats, barley and corn—which constitute the bases of rations used for growing and fattening live stock and for the production of eggs and milk.

ADAPTATION

Soybeans can be grown successfully in those areas which are adapted to the production of corn. Like most other crops highest yields are usually secured on deep, fertile loam soils, however, if nitrogen gathering bacteria are present soybeans are a more satisfactory crop than corn or other grass species on poor soil. Soybeans will grow better than most legumes on distinctly acid soils, but under such conditions the application of lime is usually beneficial. After the plants have become well established they will withstand short periods of drought or excessive moisture without injury.

VARIETIES

Only those varieties most widely grown in Canada are included herein.

Mandarin Ottawa.—A tall growing, bushy, leafy variety developed at the Central Experimental Farm, Ottawa, Ont. It is favoured by many growers throughout Ontario, western Quebec, and some sections of the Maritime Provinces.

Time required to mature	— 120-125 days.
Average yield (Ottawa)	— 31 bushels.
(Harrow)	— 33 bushels.
Colour of seed	— yellow.

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Kabott.—A medium tall, bushy variety developed at the Central Experimental Farm, Ottawa, Ont., suitable for production in sections where the growing season is slightly too short to mature Mandarin.

Time required to mature	— 110 to 115 days.
Average yield at Ottawa	— 29 bushels.
Colour of seed	— yellow.

Pagoda.—A medium tall growing, early maturing variety developed at the Central Experimental Farm, Ottawa, Ontario.

Time required to mature	— 100 to 105 days.
Average yield at Ottawa	— 25 bushels.
Colour of seed	— yellow.

Manitoba Brown.—An early maturing, relatively short variety developed at the Manitoba Agricultural College, Winnipeg, Manitoba. This variety shatters readily when mature.

Time required to mature	— 100 to 105 days.
Average yield at Ottawa	— 22 bushels.
Colour of seed	— Brown.

O.A.C. No. 211.—A tall growing, erect, bushy, leafy variety developed at the Ontario Agricultural College, Guelph, Ontario. Grown chiefly in western Ontario. Favoured for hay production in Ontario.

Time required to mature	— 125 to 134 days.
Average yield at Harrow	— 35 bushels.
Colour of seed	— yellow.

A.K. (Harrow).—A very tall growing, erect, leafy variety selected at the Dominion Experimental Station, Harrow, Ontario, suitable for production in southwestern Ontario.

Time required to mature	— 137 to 145 days.
Average yield at Harrow	— 36 bushels.
Colour of seed	— yellow (brown hilum).

Goldsoy.—A medium tall growing, bushy variety developed by the Ontario Agricultural College, Guelph, Ontario.

Maturity at Ottawa	— 2 to 4 days earlier than Mandarin.
Average yield at Ottawa	— 26 bushels.
Colour of seed	— yellow.

USE ON THE FARM

Seed.—Soybean seed provides an excellent protein supplement for live stock. It is regarded as a satisfactory substitute for high priced protein concentrates such as cottonseed meal and linseed oil meal in feeding dairy cattle, beef cattle, sheep and brood sows. It cannot be used satisfactorily for feeding market hogs because the high oil content tends to produce soft carcasses.

Many Ontario farmers use from 15-18 per cent soybeans in grain rations for live stock. Most live-stock men prefer to grind the seed before it is fed. In a few cases the mature unthreshed crop is fed in the sheaf. It is claimed that soybeans fed in the sheaf are usually thoroughly digested whereas threshed seeds fed without grinding sometimes pass through the digestive tract whole. It is a distinct advantage to be able to feed the beans whole since the ground beans tend to become rancid if allowed to stand for a considerable period.

It is sometimes difficult to grind soybeans alone in an ordinary grain grinder, but when they are first mixed with barley, oats or other coarse grains no difficulties are experienced.

Soybean meal, the residue left after the oil has been extracted from the beans at the oil mill, is used extensively in live-stock rations. The meal is somewhat higher in protein than the whole seeds and contains less than 5 per cent oil as compared with 15-20 per cent in the seeds. Due to the lower oil content the meal may be used safely to balance the grain rations of all classes of live stock including market hogs.

Hay.—Few annual legumes produce hay equal to that secured from soybeans provided the crop is harvested at the proper stage of maturity and is well cured. The highest yield and quality are secured when the harvesting is done about the time the seeds are beginning to develop. Because of the coarse stems the hay is somewhat more difficult to cure than alfalfa, but it can be handled satisfactorily by the same methods.

Soybeans are usually ready for harvest as hay less than four months after the crop has been seeded; consequently, they may be used successfully as an emergency hay crop in the event of failure of alfalfa, red clover, or other biennial or perennial legumes. The hay is regarded as being equal in feeding value to good alfalfa hay except that there is slightly more waste in feeding due to the relatively coarse stems. While the hay may be safely fed to all kinds of live stock it gives best results when fed in mixture with other roughages.

The highest yielding varieties for hay are usually the relatively late maturing sorts for the district. However, the varieties used for hay should be sufficiently early in maturity to permit of harvesting before the growing season is too far advanced and conditions unfavourable for curing hay.

As a Soiling Crop.—Soybeans may be harvested and fed green to supplement the rations of dairy cattle during dry midsummer periods when perennial pastures are relatively unproductive.

Pasture.—While soybeans provide a highly nutritious type of pasture they do not recover quickly when once grazed and consequently under average conditions they are not very productive.

Ensilage.—Soybeans alone do not make the best ensilage. However, in combination with corn they provide ensilage of high quality. For this purpose the two crops may be grown in mixture, but better results are usually secured when the two crops are grown separately and mixed in the proportion of about three parts of corn to one part of soybeans as they are put into the silo.

As a Green Manure Crop.—Like other legumes soybeans, when provided with the necessary root-nodule bacteria, have the ability to draw upon the nitrogen from the air. Hence, when an inoculated crop of soybeans is ploughed down the nitrogen content of the soil is increased. For best results, soybeans should be ploughed down not later than the flowering stage.

Straw.—Since most of the leaves fall from the soybean plant before it reaches maturity the straw consists chiefly of stem and pods. The straw of soybeans is nevertheless usually higher in protein and fat than the straw of wheat or oats and is superior to corn stover in feeding value.

CULTURAL PRACTICES

Preparing the Soil.—The seed-bed must be well prepared. Fall ploughing followed by cultivation early in the spring of the year to provide a fine, smooth seed-bed is essential. This should be followed by thorough shallow cultivation at intervals before seeding in order to destroy weeds.

Cultivation of the Crop.—Light harrowing following seeding, and just before the young plants break through the soil, aids in weed control and will destroy any crust which may have formed on the soil and which may cause damage to the young seedlings. After the crop is up, harrowing may be done

from the time the plants are 2 inches high and continued at intervals until they are 6 inches high. A light harrow should be used and harrowing should be done in a direction crosswise to the drills or rows. Best results are derived from harrowing the crop during bright warm weather and preferably during the afternoons.

When the crop is sown in widely spaced rows cross harrowing is also recommended. Cultivation between the rows should begin as soon as the plants can be easily seen and continued until flowering begins.

SEEDING

Rate.—When sown in drills spaced 6 or 7 inches apart for hay production, about $1\frac{1}{2}$ to 2 bushels of seed are required per acre. For seed production, rows spaced 28 inches to 30 inches apart have given best results. From 30 to 40 pounds of seed are required per acre in the widely spaced rows (one bushel = 60 pounds).

Time and Depth..—The time of seeding for soybeans is about the same as for corn. The seeds should not be covered more than 1 to $1\frac{1}{2}$ inches deep.

Method..—Seeding can be done satisfactorily with the ordinary grain drill.

Inoculation..—One of the most frequent causes of failure with soybeans is lack of proper inoculation. Culture containing the necessary bacteria for inoculating soybeans can be secured from many of the seed houses. Full instructions for applying the inoculum are supplied with the cultures.

HARVESTING

The Hay Crop..—The crop should be harvested for hay when the proportion of leaf is at a maximum. Soybean leaves are higher in protein than other parts of the plant except the seeds and it is therefore important not only to choose the time of maximum leaf production for harvesting but also to adopt those harvesting methods which will result in the minimum loss of leaf.

For hay of best quality harvesting should start soon after flowering or at latest when the seeds are about half developed. The methods that have been found most successful in harvesting and curing alfalfa hay may be applied successfully to the soybean crop. The usual method is to cut the crop with the mower, taking care to delay cutting in the morning until all the dew is dried off the plants. After the crop has been mowed it may be left in the swath for a day or until the leaves are thoroughly wilted then raked into windrows. After curing for two or three days in windrows the hay may be put up in small bunches to complete curing.

The Seed Crop..—The crop is ready for harvest when about 95 per cent of the leaves have fallen from the plants and the seeds are in the hard dough stage. At this stage the pods are normally brown and dry. Loss of seed through shattering may be avoided by harvesting when the plants are slightly tough from dew.

Harvesting is normally done with the grain binder and handled in the same manner as any other grain crop. The sheaves should be made small and set up in small shocks to cure or if the pods are dry and the seeds ripe and hard, threshing may take place immediately. The shorter varieties can sometimes be handled to advantage with a mower equipped with a bunching or windrowing attachment.

THRESHING

Threshing may be done satisfactorily with the ordinary grain separator. The following adjustments will help to prevent splitting of the seeds. Reduce the speed of the cylinder. Use blank concaves, pea grates or replace concaves with wooden blocks. The crop should be fed into the separator slowly.

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